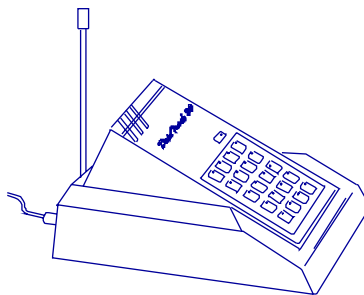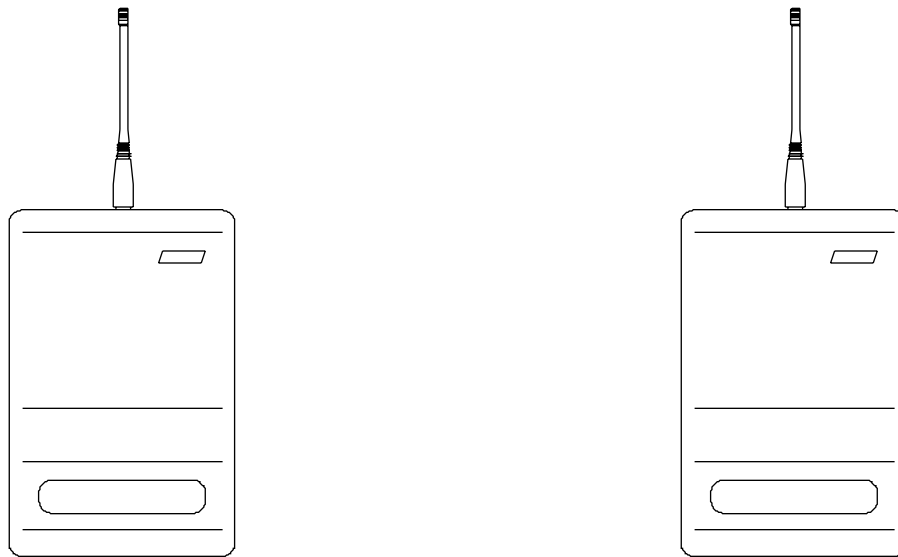# *EPOS System Controller* SCONLT/SCONTX

Installation & User Manual

SCON2/4

PREFACE

Important Installation Information

It is the purchasers' responsibility to determine the suitability of this equipment and its derivatives for any given application, Scope cannot give specific advice in this manual, as each use will require independent evaluation.

Scope has, wherever possible, employed extra safeguards to monitor the system's performance. Certain system installations, operational requirements or budgets may, however, limit the effectiveness of these safeguards. Again, the suitability of the system for any given application must therefore be decided by the installer and their customer, relative to the application and risk.

Good working practice dictates that a suitable system installation log must be generated, together with a record of the dates when the system has been manually checked, (with the aid of signal strength meters etc.) enabling the system performance to be compared with the original installation data.

For UK equipment, Scope has no control of the use and application of the frequencies issued by OFCOM. Some equipment that is licensed may have greater protection than other equipment which is operated on a WT Act License Exempt basis.

The supply of this equipment is governed by our standard terms and conditions of sale, which can be found on the reverse of all order acknowledgements*, proforma invoices*, delivery notes, price lists and invoices. Alternatively, these can be provided on request.

* Faxed proforma invoices and quotations refer to "conditions available upon request".

Important Safety Information

Scope products are designed to operate safely when installed and used according to general safety practices. The following requirements should be observed at all times.

Do NOT subject this equipment to:
Mechanical shock
Excessive humidity or moisture
Extremes of temperature
Corrosive liquids

This equipment is designed for indoor use, unless expressly stated otherwise, and must not be used in classified Hazardous Areas, including areas containing explosive or flammable vapours, unless express authorisation has been given in writing by the manufacturer. If in doubt, consult your local product dealer for further information.

Do not obstruct any slots or openings in the product. These are provided for ventilation to ensure reliable operation of the product and to protect it from overheating.

Only use a damp cloth for cleaning (not liquid or aerosol based cleaners), and ensure that any power is removed from the unit prior to beginning the cleaning operation.

Removal of covers from the equipment must only be undertaken by authorised service personnel, who must ensure that power is isolated prior to removal.

Preface

Installation

Installation must only be undertaken by an Approved contractor, who shall ensure that all work is carried out in compliance with National Wiring Regulations. For mains powered equipment, a readily accessible isolating fuse or switched socket must be located within 1 metre of the equipment.

No User Serviceable Parts

Alteration or modification to any part of this equipment, without the prior written consent of the manufacturer, will invalidate all Approvals and Warranties attaching to the equipment. Further liability for the operation of the equipment, under the applicable law, will pass to the user, who will absolve the manufacturer of any further responsibility for it's correct operation and use.

Liability

Scope does not accept liability for any damage or injury, howsoever caused as the result of misuse of this equipment. It is the responsibility of the user to ensure that the equipment is operated in the manner for which it was intended and that it is the correct item of equipment for the required task.

Warranty

This product is warranted as free from defects of workmanship and materials for a period of one year from the original purchase date. During this time, if there is a defect or malfunction of this product, Scope will, with proof of purchase, repair or replace at it's discretion any defective parts, free of charge. This does not include where the adjustments, parts and repair are necessary due to circumstances beyond the control of Scope, including but not limited to fire or other casualty, accident, neglect, abuse, abnormal use or battery leakage damage.

WARNING ! No User Serviceable Parts
Celui-ci ne contient aucune piece pouvant etre reparee par l'utilisateur
Caution ! Risk of electric shock, do not open.
Attention ! Risque de choc electrique, ne pas ouvrir.

Alteration or modification to any part of this equipment, without the prior written consent of the manufacturer, will invalidate all manufacturer approvals and warranties. No adjustments can be undertaken except by qualified and licensed persons as authorised by Scope.

This product complies with the essential requirements of the R&TTE Directive 1999/5/EC. Copies of the Declaration of Conformity covering this product can be obtained from Scope at: Quantum House, Steamer Quay, Totnes TQ9 5AL United Kingdom.

Do not discard. At end of life this equipment must be sent to an authorised waste treatment centre. Contact Scope at the above address for further details.
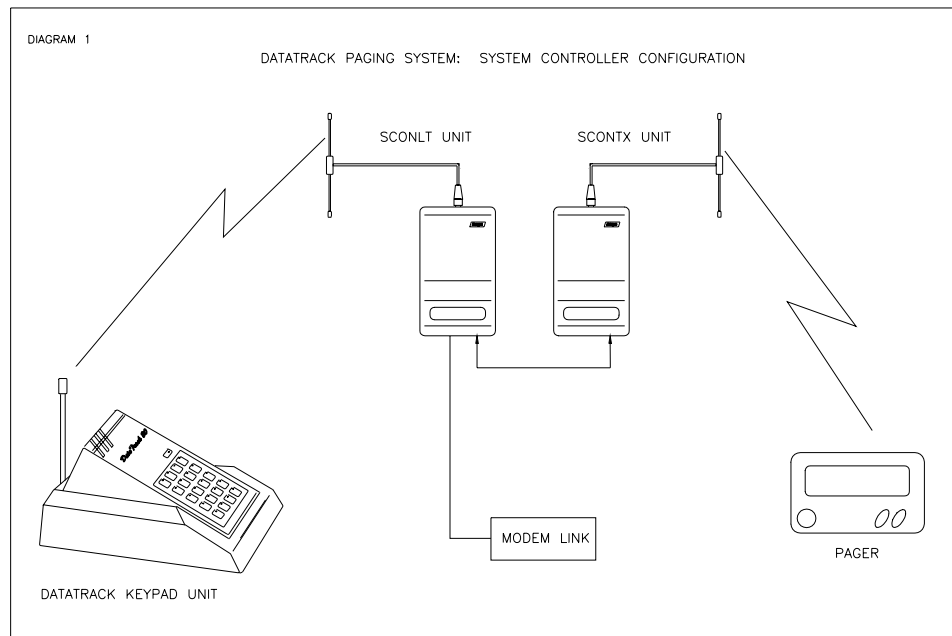
SCOPE EPOS SYSTEM CONTROLLER

Section 1

Technical Overview

Overall System Configuration:

The EPOS Paging System comprises a number of till-position keypads for transmitting any one of twenty pre-defined messages to a central controller, which will process the incoming data and re-transmit to pagers carried by members of staff responsible for specific calls issued from the keypads. The various pagers can be assigned together or individually to specific keys on the keypads, giving total control over who is paged for each call. Up to 8 individual pager numbers can be assigned to each key; in this scenario the pagers are called sequentially. Where a group identity is used, all pagers within the group are called simultaneously. The system contains a modem for remote re-programming of the configuration data and for diagnostics purposes. An external paging interface can also be added to the system by way of an additional serial port connected to a PC running Scope Paging software (Windows-based).

DIAGRAM 1

DATATRACK PAGING SYSTEM: SYSTEM CONTROLLER CONFIGURATION

SCONLT UNIT   SCONTX UNIT

MODEM LINK

PAGER

DATATRACK KEYPAD UNIT

System Controller

The system controller consists of a total of 3 microcomputers connected by way of 6 serial ports. Each micro looks after a specific set of functions and monitors the activity of the micro to which it is connected, forcing a reset if the monitored micro has lost function. This sharing of system functions keeps the individual workload of each micro and its software to a minimum, whilst ensuring that collectively there is more than adequate processing power for effective system operation.
The Microchip PIC range of microcontrollers has become an industry standard over recent years and is used in both the keypads and the power management/Radio decode module.
The NEC 78C10 used on the paging transcoder has been chosen for the vast array of on-board extras that it provides, and the unusually comprehensive instruction set which keeps software to a minimum.
The 'MERLIN', at the heart of the system, is a compact embedded controller (PC variant) allowing PC software to be utilised and offering an extremely powerful engine for the database and modem interface.

Section 1

Technical Overview

The 3 main elements of the System Controller are as follows:

1) UHF Paging Transcoder (housed in the SCONTX unit)

This product is the standard Scope ConneXions multi-port paging transcoder, consisting of a 500mW paging transmitter module, coupled with a microprocessor and attendant memory/logic to provide the data management and encryption functions. The transcoder contains three RS232 serial ports and an optional telephone interface. The circuit has a total of 32K of non-volatile Ram memory. All the programmable data for the system is held in this area of memory which retains the contents even under no-power conditions.

The transcoder is housed with the system power supply in it's own case (SCONTX). A 25-way cable connects it to the system controller and receiver/decoder in the other housing (SCONLT). Communication between the two elements is by way of one of the RS232 serial ports.
The other 2 serial ports within the transcoder are used for connection of external drivers for the paging system such as Scope Paging software (optional, requires specifying at time of order placement).
The transcoder does not control the overall system, it manages the paging system data and communicates it's status to the Merlin controller. Access to the Merlin's real-time clock to set the date and time is included within the programming menus which are accessed remotely via the modem port.

2) Embedded Controller/Modem Interface: (Merlin) (housed in the SCONLT unit)

This is the heart of the system which contains the database and main software suites. The controller itself is a compact PC-type module (hereafter referred to as the MERLIN), which has non-volatile flash memory to hold the configuration data and system software. A 'Bootstrap' program held in flash will launch itself in the case of data corruption or system failure. By this interface it is possible to re-construct the system to its original form over the modem. All elements of the system are connected in a communications loop which is capable of resetting any element considered to have failed. The MERLIN can reset the paging transcoder and the power/decoder module. The power/decoder module can reset the MERLIN if it loses communications over a set period of time. (default is approx. 40 seconds).

A reset cycle commences when the system is first powered up, or when the controllers decide that an element has failed. The power/decoder micro will momentarily remove power from the MERLIN forcing it into a power-on reset. The Merlin will then reset the paging system in the same way by removing the power momentarily. Providing all elements are now in communication with each other the system will enter the running software suite and all functions are now on-line. This 'Self-healing' design should ensure that all minor failures of the system will be recovered under all software related faults.

The user interface presents the MERLIN as a PC with a 'disk drive' B: which is in fact the Flash memory. Certain DOS commands are available to the user, for example the command DIR b: will show a directory listing of all files and directories on the Flash memory. Commands that require a response should be avoided since there is no display as such on the system and these prompts may not be visible via the serial interface. For example, if a file is to be transferred which has the same name as a file already on the system, the prompt Overwrite? (Y/N) will not be visible to the user, it is better to rename the old file or to delete it first before commencing download.
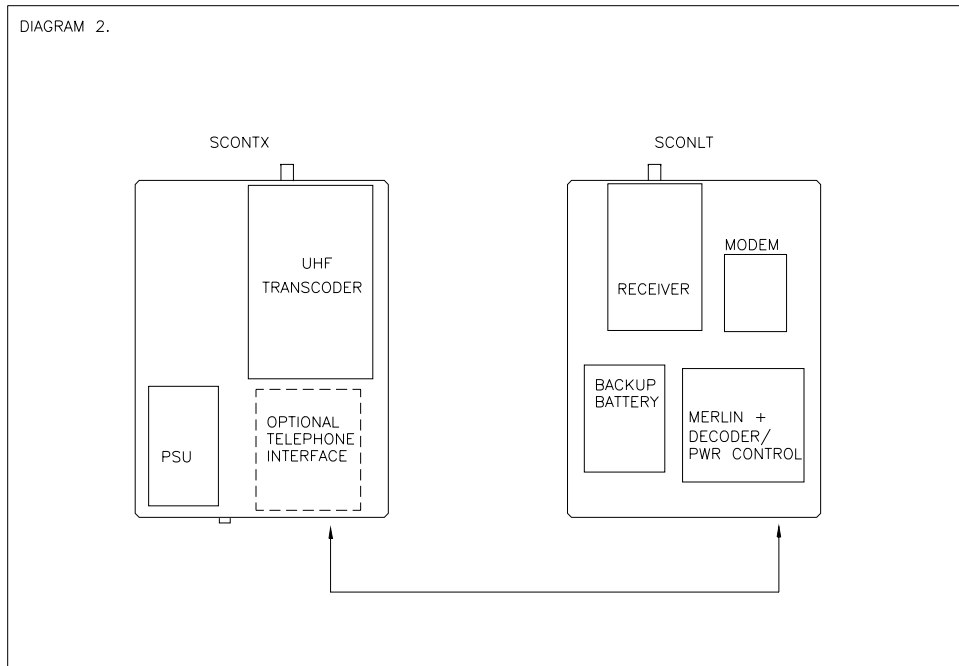
Section 1

Technical Overview

3) Power/Decoder Manager: (housed in the SCONLT unit)

This circuit comprises a PIC microcontroller with on board Flash that monitors the power supplies and also decodes any radio traffic from the keypads. The data is then passed to the MERLIN that decides what to do in line with its configuration data. Normally this would result in a paging message sent to the transcoder that would then be transmitted via radio to the pager(s).

The power management consists of measuring the voltage from the mains power supply, and monitoring the battery voltage when in mains fail conditions. The status of the battery voltage is available via the modem, and when the voltage falls to the point at which the system cannot reliably continue, the battery is disconnected and the system shuts off. This protects the battery from total discharge which might otherwise cause it damage.

Warnings are given of mains fail and battery low prior to the system shutting down; these calls are transmitted to a specific pager defined within the programming. The system will also warn that it is about to shut down just prior to doing so. Only restoration of the mains supply will recover the system once this point has been reached. The battery is disconnected until a power-up reset reconnects it to the circuits, when it will provide up to 5 hours of backup power, dependent upon the system traffic. It's presence also provides some additional regulation to the mains supply.
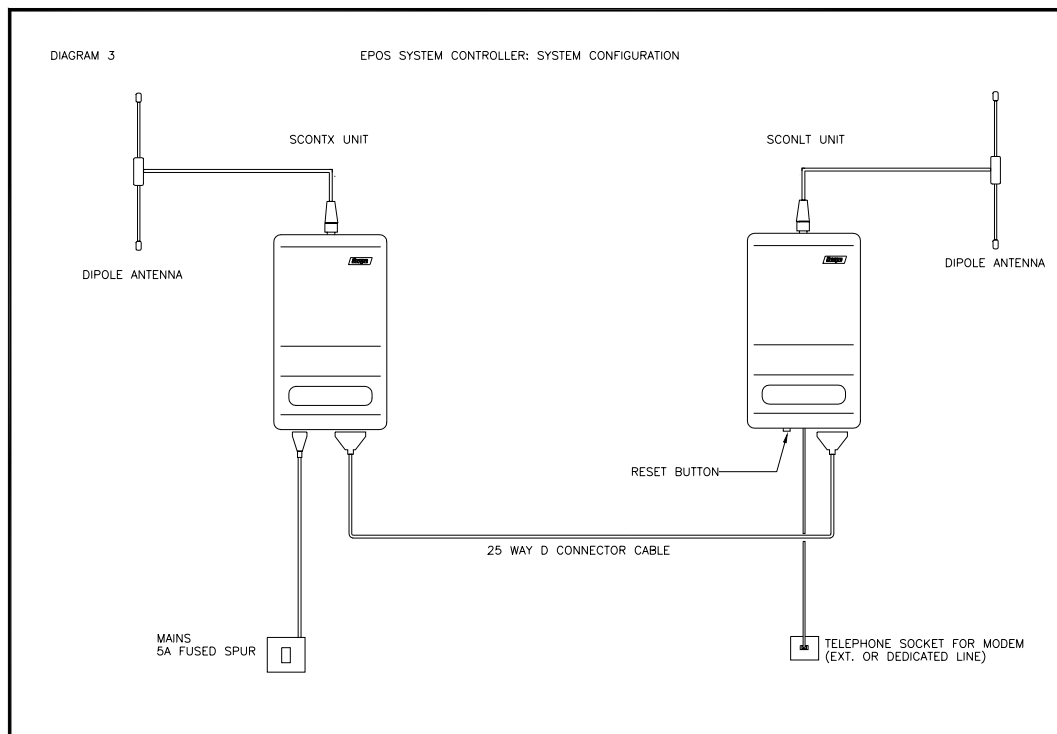

DIAGRAM 2.

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Section 2

Installation

Siting of the Hardware:

The hardware consists of two wall-mounted boxes [size in mm: 328 (L) x 190 (W) x 75 (D)] and two wall-mounted mini dipole antennas (see diagram 3).

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DIAGRAM 3                    EPOS SYSTEM CONTROLLER: SYSTEM CONFIGURATION

                 SCONTX UNIT                              SCONLT UNIT


    DIPOLE ANTENNA                                                    DIPOLE ANTENNA




                                                 RESET BUTTON

                              25 WAY D CONNECTOR CABLE

    MAINS                                              TELEPHONE SOCKET FOR MODEM
    5A FUSED SPUR                                      (EXT. OR DEDICATED LINE)
```

The location of these units is dependent on the structure of the building and the area to be covered by the system. In all cases, this will be determined by a Scope authorised engineer and agreed with the customer prior to installation. As a general guide, the system will be sited in an area closed off to the public (staff office, etc) and one that has convenient access to a telephone extension and mains supply, with a wall area sufficient to accommodate all the hardware.
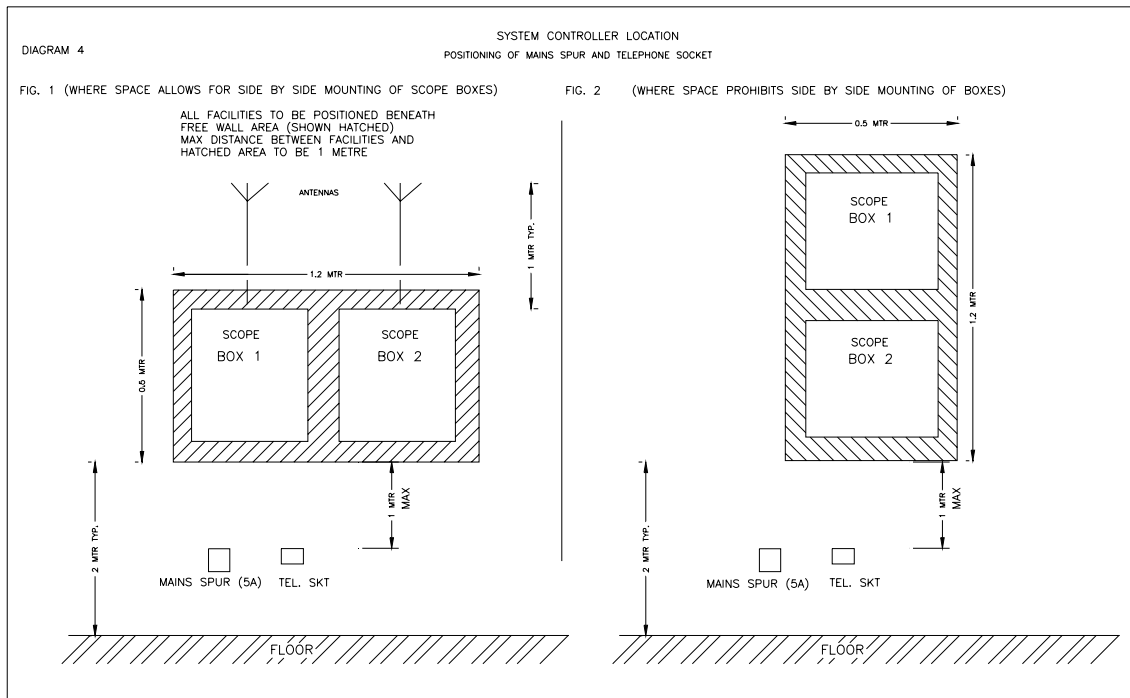
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Section 2

Installation

Facilities Required:

Mains Supply: 5A fused spur (NOT socket), located less than 1 metre from agreed mounting position of the SCONTX unit. "Clean", non-interruptible power is preferred, though not essential.

Telephone point(s): for the modem, this can be either a dedicated extension or separate line (standard BT wall socket), located less than 2 metres from the SCONLT unit.
Where the optional DTMF paging interface is specified, an additional dedicated extension (NOT direct line) must be sited within 2 metres of the SCONTX unit.

Sufficient free wall space must be allowed to mount the two boxes and antennas, as shown in Diagram 4 below.

DIAGRAM 4

SYSTEM CONTROLLER LOCATION
POSITIONING OF MAINS SPUR AND TELEPHONE SOCKET

FIG. 1 (WHERE SPACE ALLOWS FOR SIDE BY SIDE MOUNTING OF SCOPE BOXES)   FIG. 2 (WHERE SPACE PROHIBITS SIDE BY SIDE MOUNTING OF BOXES)

****

Section 2

Installation

Interconnect

A 25 to 25-way D connector cable assembly connects the SCONLT and SCONTX units. This provides the data interconnect between the various modules and feeds the dc power from the SCONTX to the SCONLT unit. Male/female connectors ensure that this can only be connected one way. Screw locks should be fully tightened to ensure that the connectors do not work loose.

Mains power is provided to the SCONTX unit via a standard IEC moulded inlet socket which plugs into the base of the unit. As stated above, this should be connected to a fused 5A spur rather than a socket (prevents accidental removal by someone looking for a convenient wall point).

The modem is located in the SCONLT unit and a flying lead is provided for connection to the telephone line (standard BT style jack).

Optional DTMF paging interface: when fitted, this is located in the SCONTX unit and a flying lead is provided for connection to an extension line (must **NOT** be directly connected to the PSTN).

Serial Ports: two 9 way D connectors are provided on the SCONTX unit for connection to external devices specified as an optional extra.

Please refer to diagram 5 for location of all interconnects.

DIAGRAM 5   EPOS SYSTEM CONTROLLER: CHASSIS LAYOUT AND INTERCONNECT
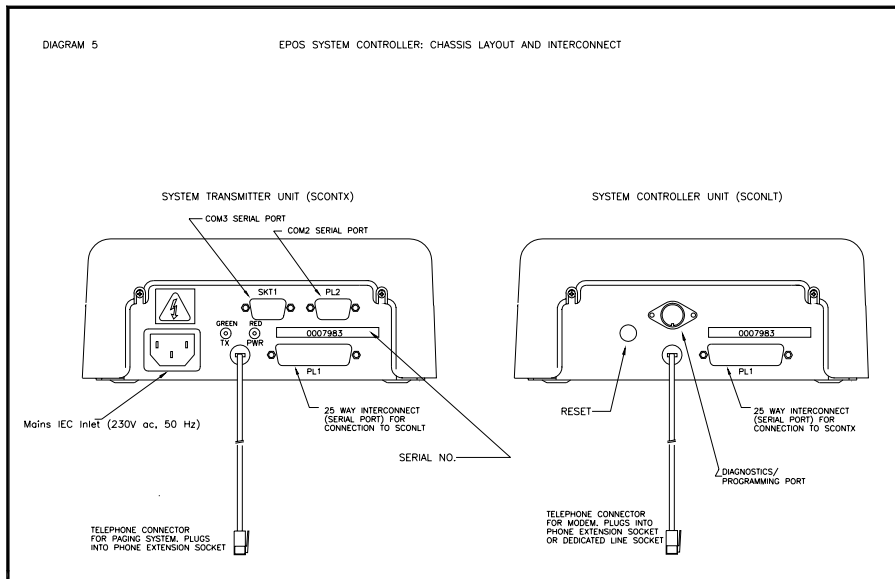
Section 2

Installation

System Power up:

With all interconnects correctly fitted, applying mains power to the SCONTX unit will cause the system to run through it's initialisation sequence.

Observing the two LED's on the base of the SCONTX unit, the following sequence should occur:

1) Red Power LED lights for 18 seconds,

2) Red Power LED goes out for 3 seconds,

3) Red Power LED lights (continuous),

4) After 7 seconds, Green Transmit Led flashes on/off twice.

5) Two consecutive messages are transmitted to a designated pager (selected at the programming stage):
Message 1: "CONTROL RESET"
Message 2: "BOOT UP"

The system is now active and ready to receive/transmit messages.

Full System Power Down/Reset:

The push button located at the base of the System Controller unit (SCONLT) is used to disconnect the internal battery when a full system power-down/reset is needed (see Diagram 3)

To perform a power-down/reset operation, proceed as follows:

1) Remove the mains plug from the SCONTX unit

2) Press and hold the button on the SCONLT unit.

3) When the Red Power LED on the SCONTX unit goes out, release the button.

4) The system is now totally powered-down.

Note! Where it is intended to immediately re-power the system, wait for 10 seconds before re-connecting mains to the unit (to allow the circuits to discharge).

Due to the in-built diagnostics and reset functions it is extremely unlikely that this operation need be performed at all, but in line with the fail-safe features of the system, it has been included as an added measure.

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Section 3

Remote System Access via Modem

There will be occasions where it is necessary to enter a system to modify data, or just to monitor a system to ensure its functionality. This may only be undertaken by a Scope authorised engineer, who will access the system controller via modem. The modem connection will enable the engineer to access up to three levels of diagnostics and on-screen programming, each of which are password protected.

For those engineers who have been issued with the system passwords, the following section provides an overview of the diagnostics and programming functions available. It does not cover the in-depth programming of data required to build an individual system, which is detailed in a separate technical document, available to trained system programmers.

Level 1: this screen is used to check functionality of the system (read only).

ACME TRADING GLASGOW 12/01/2003 10:14:45	
07/05 10:10:02 M5-6	(18/17)
07/05 10:10:18 CW3	(21/12)
07/05 10:11:21 F15	(15/05)
07/05 10:11:56 M1-2	(16/08)
07/05 10:12:23 M1-2	(16/01)
07/05 11.29.54 F15	(15/07)
07/05 12.18.42 F8	(08/14)
07/05 13.14.06 F3	(03/06)
07/05 15.51.09 F12	(12/08)
07/05 17.15.37 F9~	(09/15)
BG Sig: 39 Power: Good Bat: 100%	

The store description will obviously reflect the actual store logged on to, but this screen can be regarded as 'typical'. The present date and time appear on the top line, the log entries below will show the last 10 received calls, together with the date and time received. The characters shown after the time entry are the keypad identities as displayed on the pagers e.g. "F9", to represent Foods, Till 9. Where a "~" is shown after the keypad identity, this indicates a low signal strength received from the calling keypad. If this regularly recurs on the same keypad, then it should be returned for service. The figures in brackets are the identity number of the calling keypad, and the button number pressed, in this case, the last entry shows keypad 9 and button 15.

The bottom line shows the current background signal strength, this value will lie around 35-50 in most cases. The power reading is a Good/Fail value and reflects the status of the mains power supply. The battery level is given in % and should always show 100% with power connected to the system.

As events happen they will scroll up the screen in real-time. It should be pointed out that when connected in this way the paging is slowed down considerably, the screen is updated prior to the pager being called, and the time between the call being received and the message being transmitted is increased from 2 to some 10 seconds.

Section 3

Remote System Access via Modem

Level 2: once the correct password is typed in, the following screen will appear:

User Settings 12/05 1996 10:12:12

     1 Set date/time

     2 List Event History

     3 SPT Transmitter Interface

     X Exit System Settings

BG Sig : 42   Power: Good Bat: 100%

Option 1 is self explanatory and allows the engineer to set the date and time. This is achieved by deleting the current values shown on the screen and re-typing in the correct values. The <TAB> key is used to move from time to date, and upon hitting <Enter> the time will be sent to the clock module and the Set time screen will be exited back to the screen shown above.

Option 2 will list the event log. This can be substantial and will take a significant amount of time depending upon the maximum length defined for the log (max. 2,800 records). At any time the log can be stopped by hitting the F1 key which will abort the listing.

Option 3 This option has been included for advanced programming only. When entered, the rest of the system will be disabled until the Option is exited. It can be used to call a pager directly (for test purposes), to check and amend a system "base" pager identity number and (where fitted) alter various parameters of the DTMF telephone paging interface.

Pressing F1 will exit the transmitter interface and re-enable the system paging. Any calls received whilst in this Option will now be transmitted to the pagers.

Level 3:   once the correct password is typed in, the following screen will appear:

System Settings   19-11-1996   18:08.51

1) System Details
2) Operating Parameters
3) Power Management
4) Background Noise Check
5) Programming Options
6) File Transfers
X Exit Programming Menu

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1) System Details: this option contains the store name and the two passwords for Levels 2 & 3.

2) Operating Parameters: contains various program timing parameters. Default settings are as follows:

```
I2C Poll Interval x 500ms            [2]
I2C Poll Fail Count          [24]
Page Event Interval x 500ms  [3]
Max D/Upload Time (secs)     [9999]
Max DOS Command time (secs)      [9999]
Maximum Event Log Records    [2800]
```

Section 3

Remote System Access via Modem

3) Power Management: contains the battery level parameters. Default settings are as follows:

A/D Reading in Decimal

Fully Charged (100%) Battery   [200]
Unusable (0%) Battery   [180]

Percentage Values for Actions

Battery % to Raise Alarm   [10]
Battery % to Shut System Down [0]
Re-Generate Alarm Every (Mins)   [0]

4) Background Noise Check: contains the RF level parameters. Default settings are as follows:

Background RF Level Check

Max. Acceptable BG Reading   [80]
I2C Interval - Check Freq.   [4]
High BG Count Before Alarm   [20]

5) Programming Options: provides for all the necessary variable data entry to make up the individual store program (controls which messages go to which pager, contents of messages and identities assigned to keypads). The programming menu is displayed as follows:

Programming Options

1) Message Options
2) Pager Options
3) Button Options
4) Button Set Options
5) Service Pad Options
X System Menu

6) **File Transfers**: facilitates upload and download of the entire store data (or individual files) to/from the remote terminal via modem. Includes the option to reboot the system (performs a complete system reset).

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Section 4

System Specification

Mains Input:	230V @ 50Hz
Mains Power Consumption:	100mA max (total system, inc. SCONLT unit)
System Operating Voltage:	13.8V dc
System Power Consumption:	less than 100mA standby, 370mA transmit
RF Power Output:	500mW
Transmit Frequency:	459.225 or 459.275 MHz
Channel Spacing:	25 KHz
Adjacent Channel:	better than 200nW @ 4.5 KHz deviation
TX Baud Rate:	1200
Encoder Protocol:	POCSAG
Type Approval:	EN 300 224 (SCONTX), EN 300 220 (SCONLT, DT)
Type Approval No:	SERILINK
EMC Approval:	EN 300 682 (SCONTX), EN 300 683 (SCONLT, DT)
LVD Approval:	EN 60950
Ports:	RS232 serial/power control port 2 x optional RS232 serial ports
Comms Baud Rate:	115200 Baud
Backup Battery:	12V, 0.8 Ah sealed lead acid, provides up to 5 hrs operation in event of mains failure (subject to duty cycle)
Footprint (mm):	2 enclosures, each 328 (L) x 190 (W) x 75 (D) max

. excluding aerial

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Scope's policy is one of continuous development and specifications are subject to change without notice